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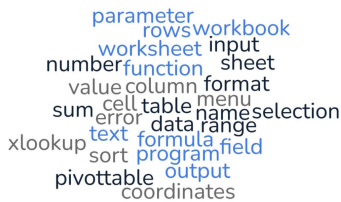
Mastering MS Excel Without a Mouse: A Practical Accessible Hands-On example

Michael Engel



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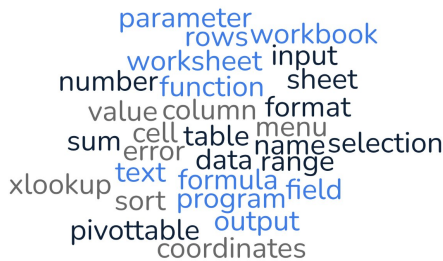

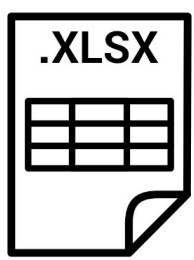

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Abstract

Help for using MS Office programmes is usually not accessible. And most accessibility content is created for apparently non-disabled users who work for people with disabilities.

Freely available accessible content for people with disabilities is commonly fragmented or outdated.

There has been no accessible, up-to-date, and detailed guide to the program.

This book is intended for people who cannot use a mouse (especially blind and partially sighted people) to give them a solid introduction to MS Excel and its most notable features.

The guide features a practical example of a simple corpus linguistics.

Keywords

MS Excel, tables, functions, formulas, data, columns, text, names, ranges, worksheets, pivot, sorting, value, analysis, context menu, options, shortcuts, filtering, menu, worksheet, parameters, settings, navigation, error checking

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A. Foreword

1. General information about the book

The name BliZ derives from **Bli**nden**z**entrum, i.e. Centre for blind [students].

Initially, we have provided a forerunner version of this work for our students, available on the intranet only.

On the next step, this version was revised, extended by a practical example, and published under a Creative Commons licence.

Finally, this work is now also available in English.

Many books are available on the widely used MS Office package. However, accessibility is often only referred to third parties. It is usually assumed that non-impaired people create content for impaired people. Impaired people are not usually addressed directly. People tend to talk about them, rarely with them. They are the third party being talked about and are left out of the dialogue. It is a shame.

The content you find online also rarely takes accessibility into account. And if it does, you often have to go to great lengths to find the information you need for your project.

This work featured with a practical example is therefore aimed at people with disabilities and provides a detailed explanation of how to use a spreadsheet program using a screen reader.

We would like to thank Mrs Laura Mathilde

Himmelmann, who took care of this topic and worked out a concrete example for the original version. Without her work, this guide would have been much more difficult to read, as a practical example makes the use of a spreadsheet program easier to understand. The analysis was altered to meet the English version, but the procedure has not been changed completely.

We would also like to thank Mrs Theresa Dietz for the final quality assurance of the original version, who gave us useful feedback improve this work.

For inexperienced users of MS Office, the original version may have seemed somewhat abstract and dry.

If you would like to use MS Excel, are reliant on keyboard operation and your skill of the program might be better, this book is exactly for you. But it is also suitable if you are a novice.

Perhaps you already have some knowledge. The book does not have to be read in one go. However, we recommend to you read the chapter First steps, essential before you start working.

We assume you have basic knowledge of how to use a computer and your tools, with the program already being installed.

Navigating through the tabs in the menu is crucial using an MS Office program. If you already have experience with a program from the MS Office package, you will certainly find it easier to get started, even as the menu structure is not the same.

If you are completely new to using MS Excel, reading this book can provide a first introduction to the practical use as well.

Some notes about the formatting might be helpful:

1. Designations in small caps are provided for menu paths, functionalities and options and indicate general designations. Depending on the voice output settings, these passages may be emphasised in the text. This does not only apply to MS Excel, but also to other software, for example screen readers.
2. Entries inside the formula bar are **emphasised by formatting** and appear in a separate line in case of an entire formula. Function names and other fractions such as coordinates appear inline.
3. Links to online sources or as cross-references inside the document are underlined.
4. Keyboard shortcuts are highlighted in **bold**. At the same time, the keyboard shortcuts are integrated into the writing process so that you do not need to use as many brackets as possible (keyword: speech output). For a better overview, the shortcuts are repeated at the end of each chapter. There are some exceptions to this rule. For example, if a list would be repetitive and it would not make things clearer, it is omitted.
   If you want to skip this step, just go to the next heading.
5. 'Names' and 'variables' deliberately giving during the writing process are enclosed in single quotation marks. This also applies to external sources, for example column names of imported data or form field labels from the essential online source

(providing the raw data for the pivot analysis). Double quotation marks may be needed in functions, when text is used as input or output.

2. About the program

MS Excel is a spreadsheet program from the MS Office package and is widely used in companies, organisations and institutions for data management, documentation and calculation.
It is not limited to pure calculation but is also a useful tool for processing data in tabular form in various applications. This applies, for example, to various office activities in everyday working life, but also to supporting data processing in the context of higher education assignments.

To introduce you to the program, we will use a simple corpus linguistics as a simplified but realistic example.

The term corpus originates in linguistics and may seem strange or complicated in the context of MS Excel. But do not worry, we will go through everything step by step to provide you with a solid understanding how to use the program in practice.
And of course, we will cover corpus linguistics just very superficially – after all, it is primarily about the program. Therefore, not all examples in the book are related to corpus linguistics.

We will also focus on error handling. And, of course, keyboard-friendly navigation will have its place, too.

We did not want to get too mathematical or abstract. After all, you will have enough to do for the time being with getting to know the program and learning more about it.

Using the practical example, you will continuously fill

the empty spreadsheet with imported data during the guide. In later practice, data might firstly not be available in its final form yet.

We assume:

1. you have basic knowledge of how to use a computer and your tools
2. The program and assistive technology are ready to be used.

Navigating through the tabs in the menu is crucial in use of an MS Office program.
If you already have experience with another program from the package, you will certainly find it easier to get started, as the menu structure is similar in some parts.

If everything is completely new to you, please do not worry. This book is not only for intermediate users, but also for novices.

B. Introduction

Before we get to the program, we will first look at the case study. With a hands-on example in mind, it is easier to get to grips with the program.

What is a corpus? - In linguistics, this term is part of everyday life and represents a collection of linguistic information. These are usually written texts, but video or audio files are possible as well. We will concentrate on texts.

We need a question start the analysis. In other words, we need the usage of two similar meaning words to compare with each other.

The question of interest: **How did the contemporary use of the loanwords meeting, deadline, timing and workload change during the last 30 years in German language?**

Do not worry, you do not have to know a single German word as only the numbers of occurrence are relevant, not the context inside the sentences.

You may wonder, why a corpus in that language has been chosen. – Many corpora are free of charge and do not provide registration. In addition, several export options are provided. You do not have to retrieve the data on your own. With a ready-made query, you are just a few keystrokes away from the raw data.

Note: This introductory analysis is only intended to

provide an example for understanding a corpus linguistics. There are other, more extensive methods of corpus linguistics, which are not relevant inside this tutorial.
For this work, a simple, hands-on example to be reproduced is sufficient to understand the program.

However, before you start analysing the corpus, you should first familiarise yourself with the corresponding settings of the screen reader (see Screen reader settings) and the first steps of the program (see Structure of MS Excel and the following) before continuing with the corpus linguistics.

C. First steps

1. Screen reader settings

Exact menu path and setting names may vary depending on your screen reader and MS Excel version.

a. JAWS

If you use JAWS as speech output, please open the program-specific quick settings in MS Excel (**JAWS + V**): Navigate via Workbook, Worksheet and Regions > Read title > Read title to the setting Read title for. You should select Each data cell. This will display the column heading together with the cell content if you have navigated to another column. Within the same column, the title is not repeated for each cell.

We generally recommend **not suppressing the titles to be read**. To do this, open the quick settings in MS Excel again, filter for titles in the search window and make sure descriptive titles are not suppressed (Suppress descriptive titles - Off).

b. NVDA

You need to make sure that NVDA recognises the headings of rows and columns in MS Excel when it speaks to them out loudly.

Inside the NVDA settings, go to Document formatting > Tableinformation and make sure Row and column headings is checked.

You can also read out the cell coordinates if you want to announce the column and row headings, as columns

are usually labelled with letters and rows with numbers.

You might try to activate the MS Excel specific UIA, in case of occurring problems with the speech output (Advanced > Microsoft UIA). As it is experimental, you will have to check another box to confirm at the very beginning of the tab in advance.

c. Narrator

Compared to NVDA or JAWS, Narrator has the advantage of being pre-installed from Windows 8 and beyond. And anyone who uses MS Office is likely to be using Windows anyway.

Inside the Narrator settings (**WINDOWS + CTRL + N**), more specifically the area Verbosity, there is a drop-down menu for selecting text and control details. Please select level 3 (All control information) or a higher one.

If you select level 5 (All control details), the column headings will also be read out to you.

The table must be formatted as such (Format cells as a table).
The dropdown buttons are also mentioned, they are integrated into the column headings and are used for quick filtering and sorting. These icons are difficult to access, but there are various ways to access any functionality. This also applies to other screen readers.

With these two settings enabled, the screen reader also announces the number of selected cells, for improved navigation.

And the use of formulas is also somewhat easier with

this formatting.

2. Structure of MS Excel

To give you an overview of the MS Excel screen's structure, it is first described in the window from top to bottom.
The order of the ranges described below may vary due to different (default) settings. However, the programmes of the MS Office package are similar regarding the layout. If you are already familiar with another MS Office program, it will be easier to get started with another one.

We will look at the following areas of the programme screen: toolbars, tabs, name field, formula bar, worksheet, work area(s) and status bar.
Use **F6** to loop through the individual areas: You will return to the first area after the last area.
There are the following areas:

- Toolbar for quick access, title bar and window buttons: The toolbar contains buttons for quick access, such as buttons for manual and automatic saving, document titles, search masks, usernames and buttons affecting the window.
  You may place frequently used buttons into the toolbar. The last button opens a drop-down menu for customisation.

- File menu tabs (e.g. Start, Formulas, Data): A tab contains multiple groups, and each group contains multiple functions.
  Example: The Start tab contains the Clipboard group, including the Paste function.

Tabs and groups used in general to bundle functions thematically. For example, the Start tab provides general functions (including the Format templates and Cells groups) or Data with the Sort and Filter group. For the visually impaired, we often name the group housing the individual functions. While groups cannot be selected at all, users with impaired vision still can use them to orientate themselves a bit better inside the crowded ribbon.

- Name field and formula bar: Using the name field (**F3**), you select areas inside the spreadsheet by simply entering the cell names without having to use the **ARROW KEYS** for a long time. The name field contains the cell coordinates of the currently selected cell (e.g. **A1**, **H3**, ...) or range (e.g. **A1:C120**).
  A range in this context is a selection of cells, may they all be adjacent or not.
  To select a larger range using the name field, navigate to the name field using **F3** and enter the cell range you want to select as follows: Cell 1:Cell n).
  The formula bar contains the specific cell contents, i.e. exactly the data you are entering in a cell. This may be static content such as plain numbers or text, but also dynamical content via functions. It is therefore, in optical regards, considerably wider than the name field. In the case of rounded values in the cells, for example, the formula bar also contains the exact, non-rounded values. Press **F2**

to navigate directly to the formula bar and fill the selected cell. You can enter simple data directly into the edit bar; for formulas and functions, an equal sign must be placed in front.
The bar is useful for sighted users as it offers more space than a cell.
Unfortunately, you cannot reach the name field and the formula bar directly with **F6**.

- Worksheet (also called sheet) with columns and rows: The worksheet contains the currently selected table. It could contain more than one, although this is not recommended due to accessibility reasons.
- A workbook (also colloquial spreadsheet) may contain multiple worksheets. A new file only contains a single worksheet initially. There are tabs under the workspace to switch between the worksheets inside the workbook. Create new sheets using the corresponding button.
- Workspace(s): The current worksheet is the main workspace. It is always there when a file has been opened. There may also be other workspaces - comments, alternative texts and other features are displayed and edited in a smaller area to the right of the current sheet. These are also called panes and views.
  Smaller workspaces are used to outsource functions to keep the main workspace lean. If you are in one of the smaller workspaces, use **CTRL + SPACE** to open a context menu, also for closing this task pane again. If multiple task panes are open, use **F6**

to navigate to a tab view of the open spaces and select a corresponding one.
Feel free to work on with the document while a task pane is open. This does not generally apply to dialogue boxes: **These must always be closed first to continue working with the document.**

- Status bar: It is located at the very end, below the tabs for the various sheets of the workbook. Here you will find helpful information about the workbook, for example, whether there are accessibility issues or not (images not inline, missing alternative text, ...).
  However, the accessibility check is quite superficial and does not cover certain aspects. For example, there is no warning in case another table exists inside the same sheet.

The layout is made up as follows: At the top are the toolbar and the ribbon with the tabs and the name and formula bar. The main workspace in the centre may be supplemented by task panes on the right-hand side. The status bar follows at the bottom.

Dialogue boxes may appear in the foreground depending on the context. If MS Excel starts without a specific file being opened, the start screen appears, where the programme-specific options and the most recently opened files may be called up directly, among other features.

Press **ALT + F** to open, **ALT + N** for a new, empty file, or **ALT + R** to select a template on the start page. Or select recently used (> **YB**), pinned (> **YC**) or shared files (> **YD**).

Keyboard shortcuts and menu paths inside this section:

- Select the areas in a loop: **F6**
- If available, open a task pane specific context menu: **CTRL + SPACE**
- Formula bar content: **F2**
- Go to name field: **F3**
- Open: **ALT + F**
- New file: **ALT + N**
- Start page with various options: **ALT + R**

3. Using the menu bar

In most cases, we will describe how to select a feature or a task using the menu bar.
This is how to get around the menu bar using the keyboard: Use the combination of **ALT** followed by at least one letter. Specifically, this means a key combination according to the following pattern: **ALT > letter(s) > letter(s) and/or number**.
To navigate the menu, proceed as follows: First press **ALT** briefly, release the key immediately, select a letter for the tab and at least one other abbreviation to access the desired function within the tab. Shortcuts are usually made up from of one letter, sometimes two or one letter and a number.

Pressing **ALT** activates the ribbon.
The first letter selects a ribbon tab.
The subsequent letter, letter pair, or letter-number combination selects a specific command within that tab and executes it.

Alternatively, you may always use **ALT in conjunction with **ARROW KEYS** as well.**

An example using the keyboard shortcuts while assigning a number format:
Home > Number > Number format – keyboard shortcuts: **ALT > H > FM**.

The > sign always implies to **hit the keys one after the other**.
Shortcut keys with a + sign imply to **hit them

simultaneously** instead.

The formatting of a cell determines its type. It can be a number, a price, a date, a word or something else. Better take care of the formatting before you continue working with the data.
A common mistake: Numbered values formatted as text cannot be used in calculations.

There are many real-life examples of people who have suffered major financial losses because they did not take this issue seriously.

As number is a menu group, no keyboard entry is required here. The area is not directly selected by keyboard shortcuts, it only serves as a guide for sighted users.
However, we also always refer to navigation via the menu as it is easier to familiarise yourself with the functions and you do not have to remember all the shortcuts. You can also navigate through the menu using the **ARROW KEYS** or the shortcuts. You are always free to choose.

You do not have memorize the commands. You always learn at least two ways to select a function. And a context menu is also available quite often. It remains up to you to choose.

Common keyboard shortcuts for operating MS Excel can be easily looked up in Microsoft's online help (**Keyboard shortcuts in Excel**) [(Microsoft Support, n.d.)].

Please be aware that the assignment of a certain shortcut for operation may change over time, especially

for functionalities used rarely.
Minor differences in general may also occur as the program version progresses.
This tutorial is written for Windows. If you are using another operating system, some functions may be named differently. The keyboards shortcuts might also be different. But you might be able to remap them, which is not part of this tutorial.

Important: If you have performed a step via the menu (e.g. selecting a number format) and want to perform another one via the menu, you must navigate from the beginning again when using the keyboard, i.e. enter the entire shortcut again. In concrete terms, you have to start again with **ALT** to perform another step. This also applies if you do not want to change the tab after all.

Example: You want to assign two number formats for different columns. After you have closed the corresponding dialogue window for the first column and want to open the next one, you have to run through the menu path a second time from the beginning for the other column.

We have in consequence summarised the following aspects in this chapter: Navigation in or through the ribbon and the tabs, and the keyboard shortcuts used for navigation.

The first specific application example dealt with is the assignment of number formats.

Keyboard shortcuts and menu path inside this section:
Home > Number > Number format -
ALT > H > FM

4. General structure and basic settings

a. Structure

The programme is complex and unfamiliar to inexperienced users, as the tabs with the many different operating functions make it difficult to get an instant overview. In the following, we will therefore go through the most important components of MS Excel step by step to make the program more understandable and accessible for you as a user.

Starting the program, a single empty sheet will usually appear on your screen, unless you open a modified file.

This sheet contains empty cells and in case you would like to add new content to the right of the existing table, you do not need to insert cells explicitly – just fill in the empty cells.
Inserting is just a matter if you want to add content **between already existing cells**.

A file in MS Excel is a workbook, but what exactly is it? – It consists of at least one worksheet, an area within the workbook to enter and display the data.

Unlike a MS Word document, there is no completely blank page to be filled. Instead, there is at least one sheet with blank columns (named with letters) and blank rows (named with numbers). A new sheet is still entirely empty and does not yet have any formatting.

Several individual tables might be inserted into a sheet. **However, abiding to accessibility, we recommend

always creating a separate, new worksheet for each new table**.

In MS Office, you can do everything using the ribbon, tabs and groups. By default, the ribbon includes these tabs (**ALT** > ...), each subdivided into groups:

- File (**F**): Home, New, Open, Save, Info, Save, Save As, Print, Export, Close, Account, Options
- Home (**H**): Clipboard, Font, Alignment, Number, Styles, Cells, Editing, Add-ins
- Insert (**N**): Tables, illustrations, Controls, Charts, Sparklines, Filters, Links, Comments, Symbols
- Draw (**JI**): Drawing Tools, Convert, Replay, Help
- Page layout (**P1**): Themes, page Setup, Scale to Fit, Worksheet options, Arrange
- Formulas (**M**): Function library, Defined names, Formula Auditing, Calculation
- Data (**A**): Get & Transform data, queries & connections, data types, sort & filter, data tools, forecast, Outline
- Review (**R**): Proofing, Performance, Accessibility, Language, Changes, Comments, Notes, Protect, Ink
- View (**W**): Worksheet view, workbook views, Dark Mode, Show, zoom, window, macros
- Automate: (**U**): Scripting Tools, Office Scripts,

Flow Templates

- Help (**Y**): Help
- Table design (**JT**) - just visible in case a formatted table (or a part of it) is in focus: Properties, Tools, External Table Data, Table Style Options, Table Style

This list is not a roadmap for the guide. We will not explain every feature of the program as this would excess the scope.

If you are already familiar with another program from the package, you may have noticed that MS Excel has fewer tabs than MS Word or MS PowerPoint, for example. The Formulas and Data tabs appear in MS Excel, but not in MS Word. You may have already learnt about the other tabs in the MS Word guide. But again: You do not need any skills for MS Word to find your way around this guide and MS Excel.

b. MS Excel options

As usual in MS Office, access the options via the path File > Options - **ALT** > **F** > **T**. The MS Excel Options dialogue window shows up.

There, one you have picked a topic from the left, more specific issues will show up on the right to check or alter settings.

This programme is a spreadsheet software. Therefore, please go directly to the Formulas area where the following settings can be found:

- Calculation options: You can set whether the single worksheet or entire workbook should be

automatically updated if an affecting value is being changed. You can also select whether data tables should not be included in this automatic calculation or whether the workbook should be calculated manually (**F9**). However, it might be worthy considering switching off the automatic calculation, as the programme gets slower as the sheets grow larger.

- Working with formulas: The R1C1 reference type for labelling cells can be selected in this area. With this option, the columns are also labelled with numbers instead of letters, according to the R1C1 format: Unlike the default designation of cells (e.g. cell C1 in column C, row 1), the row is named first and the column afterwards. Cell C1 is therefore labelled R1C3 (row 1, column 3) after the R1C1 reference type. If you activate the AutoComplete setting for formulas, a list of relevant formulas is displayed in the formula bar when formulas are entered. For example, if you enter **=S** in the edit line, a drop-down list of all available formulas beginning with 'S' is displayed, where you can choose the appropriate one from. The list gets shorter as you type.
- Error checking: You can activate an error check running automatically in the background. Unfortunately, the error check is only partially accessible.
  It is still advisable to leave it activated: Because only in this case you can use an accessible context menu to handle the error. Find out more about

errors in the chapter Error handling.
The safest thing to do after entering a formula is to return to the cell and check whether an error code has appeared there (see the section Error messages).

- error checking Rules: Define the cases for an error message to appear. However, even if you have switched off a message, errors can still be found using the manual troubleshooting function in the menu. We will cover manual troubleshooting later.

The following settings for importing and analysing data can be found under the Data tab:

- Data options: The default layout of PivotTables can be customised here, and settings can be activated or deactivated. The guide deals with the so-called PivotTables in more detail in a later chapter (Pivot table for a concise data analysis).
- Show legacy data import wizard: This can be used to save login information, for example.
This is somewhat more convenient, but it is not recommended for security reasons.

In the Advanced area, you will find a comprehensive list of settings. Here are some examples:

- Editing options
- Cut, copy, paste
- Diagram
- Display
- Formulas

Compared to the options in MS Word, there are specific functions extended for working in MS Excel: Inside Editing options (the first Advanced area) you find some very helpful functions, for example:

- *Move selection after pressing the Enter key*: Select this function to specify whether and in which direction (down or right) the focus (the selection of a cell) moves as **ENTER** has been hit.
- *Insert decimal point automatically*: Set whether an entered number should be automatically converted into a decimal number ('169' becomes '1.69' with two decimals).
- *Activate fill-in boxes and drag & drop of cells*: If activated, data series are filled. For example, if there are rows of numbers such as 1, 2, 3 in cells in a column below each other, or in cells in a row next to each other, these can be continued as far as required using drag & drop over the corresponding column or row. The same applies to rows referring to words or abbreviations, such as Mon, Tue, Wed, … or Jan, Feb, Mar, …
- *Activate AutoComplete for cell values:* The automatic completion of cell contents might be helpful. For example, if you type 'Lon' inside a column already containing the entry 'London', it is automatically suggested as input. This happens when the typed letters match an existing value in the same column unambiguously.
  The suggestion can be accepted with **ENTER** and the focus moves to the next cell. If you instead

wish to ignore the suggestion, simply continue typing. It will disappear automatically in the process.

- Adopt separators from the operating system (regarding the question of how decimal numbers and thousands are to be separated - whether with a comma or a dot).
- Cursor movement: Choose between logical and visual. This is only relevant for languages that do have the left-to--right writing direction. Logical implies a movement to the right with the **LEFT ARROW** here, for example when moving in an Arabic text. Visual always moves the cursor into the same direction as the corresponding **ARROW KEY**.

Please also take a brief look at the accessibility category.

- Using Make your document accessible for others, you activate the accessibility check running in the background while you work on the document. If there are accessibility problems, a reminder will appear in the status bar.
- Feedback options: Select whether feedback will be supplemented by sound or animation. This applies for common activities such as cutting or pasting.
- Application display options: You may switch on tooltips (small windows with descriptions) or force the start screen to appear when the program starts.

Now that you are familiar with the key components of the screen template and ribbon structure, and the important settings in the Options menu, you can move on.

The next chapter will teach you how to navigate within and between sheets.

Shortcut keys and corresponding menu path inside this section: File > Options - **ALT** > **F** > **T**

5. Delete versus clearing content

As there is a vital difference between deleting and clearing content, we have brought forward this aspect before you will come into this situation.

Unless you are deleting an entire sheet, the effects of deleting do vary – are you deleting content, formatting or cells/ranges? The functions for deleting or clearing content in cells, rows, columns, tables or entire ranges can be found under Home > Cells > Delete - **ALT** > **H** > **D**. Depending on whether a cell, row or column is to be deleted, an additional letter is added to the end of the abbreviation. If you want to delete content, make sure you are first in the correct range. This applies to cells, rows, columns, tables and defined ranges:

- Delete (**ALT** > **H** > **D** > **...**)
  - CELLS (ALT > H > D > D): The cell and its contents are deleted. In MS Excel, the term cell refers to the individual boxes on the workspace. If you delete (or add) cells, you will be asked in a dialogue box whether adjacent cells will be moved horizontally or vertically.
    Choose between MOVE CELLS LEFT, MOVE CELLS UP, ENTIRE ROW and ENTIRE COLUMN.
  - sheet rows (**R**)
  - sheet columns (**C**)

    - Table Rows (**L**): Deleting is limited to the table.
    - Table Columns (**M**)
    - sheet (**S**): The **entire worksheet** is deleted with its complete content.
- Clear (**ALT** > **H** > **E** > …): Chose among further options.
    - Clear All (**A**)
    - Clear Formats (**F**)
    - Clear Contents (**C**) – alternatively, just press **BACKSPACE**
    - Clear Comments and Notes (**M**)
    - Remove Hyperlinks (**L**)
    - Remove Hyperlinks (**R**)

Keyboard shortcuts and menu paths inside this section:

- Deleting functionalities: Home > Cells > Delete - **ALT** > **H** > **D** > **…**
- Clearing functionalities: Home > Editing > Clear – **ALT** > **H** > **E**

6. The beginning: Open a new file / Roadmap

Having passed the first steps, you can now move on to a hands-on example.

First open a blank workbook. If you are already in a worksheet, hit **CTRL + N**. A new one will be opened. As usual, the quickest way to save and open files is with **CTRL + O** (open) or **CTRL + S** (save).

To fill the worksheet, you could enter content into the cells one by one. But this process would be quite laboursome. For the purposes of this guide, we will therefore avoid typing and instead import the required data.

In practice, you will often be faced with the task of importing data from another program rather than entering it manually.

An import is a quick process usually. However, make sure that the original data has the correct character encoding. Remember the keyword UTF-8 in this context, we will come back to this later. For the import, you should provide the data in a way that the program can subsequently differentiate between a new cell and row.

A common example is the import of data from MS Access, a program for creating and managing databases.
However, we have decided not to use the data import route from MS Access because we cannot assume that

you have already worked with databases, as readers of this guide may have various levels of experience.
We also do not want to impose a second program on you and make it even more complicated to get started.
Therefore, the introduction should cover texts, as we have all had to deal with this at some point.
In addition, the data should be freely accessible and available quite quickly, i.e. without additional software or registration, so that the material is available swiftly.

Since sheets are very rarely filled out manually, the choice fell on a corpus linguistics to address the possibility of importing data into the guide.

Corpus linguistics is the analysis of words according to specific sets of rules.

Using corpus linguistics, a collection of text can be searched for the occurrence of words.

The next chapter deals with corpus linguistics and getting started with MS Excel hands-on.

Please keep in mind: You do not need any linguistic skills for this example at all.

Keyboard shortcuts inside this section:

- Open a new file: **CTRL + N**
- Saving a file: **CTRL + S**
- Open an existing file: **CTRL + O**

7. Navigation

a. Basic navigation

Navigating inside a sheet, use the **ARROW KEYS** to move between the respective cells.

Use the **SHIFT** key with the arrow keys to select entire ranges of cells. Example: If the cursor is in cell **A1** and you press the **RIGHT ARROW KEY** once while holding **SHIFT**, followed by the **DOWN ARROW KEY** twice, you will have selected cells **A1** to **C3**. **A1:C3**.

With **SHIFT + CTRL** and the arrow keys (or with a single **CTRL + A**) you can quickly select the **entire table**, while with a double **CTRL + A** you select **all cells of the worksheet**.

Instead of using the arrow keys, you might also proceed as follows:

1. With **CTRL + G**, the *Go to* dialogue *window* shows up
2. Enter the desired start cell and target cell here, separated by a colon (for example **A2:G12**).
3. Select **OK** to confirm the entry and close the dialogue window. The range entered is highlighted.

To switch between different worksheets, use the following key combination: **CTRL + PAGE UP / PAGE DOWN**. Alternatively, press **F6** to switch to the

worksheets and select the favoured one using the arrow keys.

Please keep in mind: In an empty or new workbook, there is only one single worksheet with the name Table1 at the start. We recommend creating a new one for each table giving it a meaningful name. Use **ALT + SHIFT + F1** to create a new one prior to the current one. Use Rename to change the name of the worksheet via the context menu.

As an aside: To delete, press **F6** until you reach the tabs representing the worksheet. Open a context menu with **SHIFT + F10** where you can finally delete the worksheet.

Keyboard shortcuts inside this section:

- to select more than a single cell: **SHIFT + ARROW KEYS**
- Select table: **CTRL + A** (once)
- Select all cells of the worksheet: **CTRL + A** (twice)
- Navigation via the Go-to window: **CTRL + G**
- Change worksheet: **CTRL + PAGE UP/DOWN** (or navigate to the worksheet tabs with **F6** and make your selection using the **ARROW KEYS**)

b. Inserting a function

We will start with a rather simple example, the **IF** function.

Let us assume you would like to check whether a value in a specific cell (A2) is equal to 100 or greater and have an output accordingly – "yes" in case of 100 or

greater, "no" in the other case. For the output, you need a formula.

The following example is not dynamical as it is limited to a single cell, just to make clear the possibilities of navigation. If you would like to know about more complex examples, go to the chapter Formulas and functions.

Move to the cell where you want your output.

Variant 1: Manually

You can type in the formula manually in one go and press ENTER afterwards:

=IF(A2>=100,"yes","no")

In this simple example, you might already three parameters: The logical test (A2>=100), the value if true ("yes"), and the value if false ("no"). The parameters are separated by delimiters, in this case commas.

As an aside: Depending on your language settings of your operating system and your software, the semicolon might work as delimiter instead. Please give it a try to find out the suitable variant. Be it comma or semicolon, mixing them up will not work.

Sometimes, you cannot recall the function name exactly or you are not sure about the parameters.

Variant 2: Dialogue Window "Insert Function"

1. Press either **SHIFT + F3** to open the dialogue window, or open it via Formulas > Function Library > Insert Function – **ALT > M > F**.
2. You may either search for a function inside the

first input field and press Go to get a list of recommendations below or select a category.

3. Select the appropriate function and confirm with **OK**.
4. In the next view (Function arguments), enter the parameters into the corresponding fields. The number of fields and the labels vary. Confirm with **OK**.

Variant 3: Autocompletion

1. Inside the cell, begin with an equal sign
2. Type the first letter(s) and choose a suggested function with arrow down/up
3. Confirm with Tab
4. Press **CTRL + A** to open the Function arguments
5. Fill in the fields and confirm.

c. Using column names in formulas

Once the cells formatted as a table, you can address columns by their header name.

The nomenclature of columns is limited to:

- letters
- numbers
- spaces
- underscores and hyphens

Columns are named by their header cell. See the subsection Structured references for more information and an example.

d. Using names via the name field

Avoid cumbersome use of the arrow keys by entering coordinates for navigation or selection.

The name field is in front of the formula bar. Go to it with **ALT + F3**.

Individual cells or entire ranges can be selected by entering a name in the name field followed by **ENTER**. To select cells or ranges, there are a couple of options, for example:

- Select a single cell: **B13**
- Select ranges: **A2:G101**
- Select entire columns: **A:A** (column A) or **A:B** (columns A and B)
- Select entire lines: **1:1** (first line) or **1:2** (first two lines)
- Areas with columns, not necessarily adjacent to each other: **A:A,E:G,I:I** [columns A, E to G and I]
- Named ranges: Ranges offer you to work with names using meaningful formulations instead of cell coordinates (see section Define names with ranges).

These examples are for columns; to select lines, use number values.

Keyboard shortcut for this subsection: Focus in the name field - **ALT + F3**

D. Case study: corpus linguistics

1. The term corpus and selection of a suitable database for data import

You need to collect data to work on your task. Let us work with a complete collection of text, a so-called corpus.
This is a context-related collection of texts. A corpus is always dependent on the environment and the time of origin. Every corpus is unique.
Accordingly, there are various corpora to choose from when searching: For example, from well-known newspapers or other contexts (Colloquial, law, medicine, blogs, ...). Depending on the context, some words occur more or less frequently than others do. Some words may only be found in specific corpora. A corpus is therefore dependent on its background - this applies to the period, but also to the context of use. For example, a legal corpus is different from a web corpus as there are varying technical terms in each case. However, in practise, feel free to choose a corpus deliberately.

a. How did the contemporary use of some loanwords change during the last 30 years?

As mentioned before in the introduction, you first need a subsect of interest for the corpus linguistics.

Let us look at the use of some anglicisms in German language. Please do not worry, **you do not have to know the slightest thing about German language or

corpus linguistics at all!**

But in case you would like to read a bit further about the latter topic: Jonathon Reinhardt, A. G. (2023). Critical Language Awareness: Language Power Techniques and English Grammar. Retrieved from **https://opentextbooks.library.arizona.edu/languageawareness/chapter/c-intro-to-corpus-analysis/**

At the end, the texts are not important at all, you will just need the keywords (i.e. the loanwords which are the matter of interest).

The columns containing the bulk of the text will be hidden.

The question: How did the contemporary use of the loanwords meeting, deadline, timing and workload change during the last 30 years in German language?

A yet blank result table of this study might look as follows:

Year	Meeting	Deadline	Timing	Workload
1996				
...				
2025				

Another example could be a table by decades:

Period	Meeting	Deadline	Timing	Workload
~2000 [1996 to 2005]				
~2010				

[2006 to 2015]

~2020 [2016 to 2025]

b. Getting the raw data from the source

There are different approaches to get the data.
Retrieving itis part of the work, but not part of the program itself.
Nevertheless, as hardly anyone would fill a sheet manually, this should undeniable be part of this tutorial.

The DWDS (literally Digital Dictionary of German language) provides an input form for queries.
The result can be shown in the browser or saved as a file.

Please open the query input page for 'Contemporary corpora with free access': **https://www.dwds.de/d/korpora/dwdsxl** [(DWDS, 2026)]

You will certainly wonder, why a German source has been chosen.
Although German is far less spread than English, the DWDS requires no registration or charge for a decent amount of data. The export from the browser also straight forward and simple.

We assume you use your browser's translation feature, but we provide the German labelling here as well.

Inside the yet sole input field, paste:

Meeting||Deadline||Timing||Workload

By confirming it, further inputs become available.

- 'Body': *Gegenwartskorpora mit freiem Zugang* (Contemporary corpora with free access) – should be pre-selected already
- 'Searching': **Meeting||Deadline||Timing|| Workload** (|| is for or)
- 'Start': 1996
- 'End': 2025
- 'Display' (*Anzeige*): KWIC (key word in context, the column for the keyword is accompanied by those for content right previous and after it. **Please toggle the display options to ensure the data will be randomized by date.**
- 'Sorting' (*Sortierung*): random (*zufällig*)
- 'Hits per page': leave it as it is – irrelevant for exporting

Scroll down to the bottom of the page and press 'Exporting hits' (*Treffer Exportieren*). A now dialog box will open ('Exporting body results'). Please choose the following options:

- 'Hit format' (*Trefferformat*): KWIC
- 'Number' (*Anzahl*): (feel free to choose, but type in at least a few hundred)
- 'Data format' (*Datenformat*): TSV (*tabsepariert* (separated by tab)) – the CSV option did not work in this example)
- 'Hit page' (*Trefferseite*): 1

- 'Output' (*Ausgabe*): 'Browser' (*im Browser*) – to prevent any problems with special chars)

Hit the button 'Exporting' (*exportieren*) and a tab separated list will be rendered inside the same browser tab.

Copy the data and save it as a text file ('txt').

In this example, only the times that the loanwords are used are important. But as the special characters inside the text should be shown correctly, please make sure that the file uses UTF-8 coding.

Hint: If you want to reproduce this, open a text file with the Windows Editor. Try to save it as a new file. In the upcoming dialog box, UTF-8 must be set as coding. UTF-8 is a very widely used character encoding. This make sures that special characters are not missed out when importing into MS Excel.
In an English text, a Euro sign is a widespread symbol yet considered a special character. Not to speak of the umlauts (Ö, Ä, Ü, ö, ä, ü) and the Eszett (ß), special letters as part of the German alphabet.
Alternatively, you can also use another editor to copy and save the list. **Just be sure the data is UTF-8 encoded and a text file.**

Your raw data is now available.
As a web browser is an essential part of modern life, this approach has been chosen.
In real-life scenarios, your data might have a different origin, MS Access for instance. But we will not cover this here, as we cannot assume that you are familiar with it.

c. Importing the data into MS Excel

With the data ready to be imported, the creation of the table is a matter of a few more keystrokes.

Please return to MS Excel and open a blank workbook.

Go to Data > Get & Transform Data > From Text/ CSV – **ALT** > **A** > **FT**. Inside the open file dialog box, select a TXT file and press Import.

This might take a short while.

Inside the upcoming dialog box, please select the button Load at the bottom, after confirmed TAB as delimiter and chosen Based on entire dataset as data type detection.

The data has now been imported into a **new** worksheet named after the file. This new sheet is in focus now. It contains an already formatted table, ready to be sorted and filtered.

On the right side, a pane (Queries & Connections) has been opened. While this new feature has its right to exists, it lacks accessibility. So, we should use the customary tools.
If you like, you can cycle to the pane and close it via the context menu (**CTRL + SPACE**).

The structure of the table will be as follows:

- 'No.' (irrelevant)
- 'Corpus' (the sub-corpus)
- 'Date' (US format)
- 'Genre'

- *Gebrauchsliteratur* (functional literature)
- *gesprochen* (spoken)
- *internetbasiert* (web based)
- *Wissenschaft* (Science)
- *Zeitung* (News)

- 'Bibl' (information about the source)
- 'URL'
- 'ContextBefore' (original text before the keyword, irrelevant here)
- 'Hit' (the keyword, whether be it meeting, deadline, timing or workload)
- 'ContextAfter' (original text after the keyword, irrelevant here)

As the import is done, you can finally spend time working with the program.

You will trim down the table in the upcoming process.

But at first, please save the file as a workbook (.XLSX).
You can choose **CTRL** + **S** to open a reduced dialog box or File > Save as (**ALT** > **F** > **A**) for advanced options.

Only the first three rows of data are shown here.

The column names are the same in each case. The content depends on the corpus you have selected and the query you have made.

What the table could look like:

[Source: Corpora hits for »Meeting||Deadline||Timing||

Workload«, from the corpus 'Contemporary corpora with free access', provided by the DWDS (Digital Dictionary of German Language) <**https://www.dwds.de/r/?q=Meeting%7C%7CDeadline%7C%7CTiming%7C%7CWorkload&corpus=dwdsxl&date-start=1996&date-end=2025&sc=adg&sc=bz&sc=blogs&sc=bundestag&sc=** accessed on 23th January 2026.]

Table 1: Sample browser export (extract)

Bibl	URL	
Geistliches Lied in den Vereinigten Staaten. In: (...)	https://de.wikipedia.org/w/index.php?oldid=261896755	Sunday Songs durch fröhliche, eingängige Melodien aus, (...)	Song
Das Herzstück der Redaktionssitzung. Der Nur mein	http://das-herzstueck-der-redaktionssitzung.de/	Dann muss man im Kalender	passt man muss ja auch

		Standpunkt, 2013-02-16	vermerken (...)	noch schneiden und hochladen ?
[illegible]	[illegible]	Graeme Sounes. In: Wikipedia – Die freie Enzyklopädie. 24.09.2025	https://de.wikipedia.org/w/index.php?oldid=260029143	Das war 1. Veröffentlichung am 14. April 1992, (...)	verpasst, so dass der Artikel gemeinsam mit dem Foto stattdessen am 15. April gedruckt wurde – (...)

Hint: If you want to carry out more than one import, use one worksheet for each import and name all sheets meaningfully to make sure a descent workflow.
If you create a table yourself to analyse the data, you should use a new sheet as well.
As a basic principle: **Use an individual sheet for each table.** This will facilitate navigation significantly.

Keyboard shortcut and menu path inside this subsection: Open a file for data import, and force other

file formats via Browse: File > Open > Browse (**ALT** > **F** > **O** > **O**)

d. Format cells as a table

For accessible working in MS Excel, it is essential to format the data as table.

In this case, it has already happened during the import.

But if you insert data into a sheet by copy and paste or typing in manually, it will not happen automatically.

Formatting offers essential advantages in terms of accessibility:

1. Filtering and sorting are not only available via the menu but also more directly inside the table itself, more specifically the head row.
2. You can write more comprehensible formulas with a formatted table: You can use the column and row headings.
   This means that you are not necessarily dependent on the coordinates (**A:A**, **B:B**, ...) for columns and rows. Use the @ symbol preceding the column to address it. Read the subsection Using column names in formulas for details.
   Using headings improves a formula's readability.
3. And finally: If you want to insert a function in a neighbouring column, the program offers to fill down, i.e. to add it to the entire column.
   Without formatting, the formula could not be added to the entire column (see chapter Formulas and functions).

In the menu, select Home > Format

templates > Format as table (**ALT** > **H** > **T**). A dialogue window opens with various designs. Select one here, classified by the categories Light, Medium and Dark. The Create table dialogue box appears. The table selected for the formatting must be entered in this box. In most cases, the range is automatically recognised as a table correctly, so you do not need to enter or alter anything here. Confirm the range and the design of the table will change.
This not only provides the table with a (preferably high contrast) design, but further options are available in the header (i.e. first row): If you now select a cell there and press **ALT**+**ARROW DOWN**, a context menu opens for quick filtering and sorting of the table. This feature is called data slicing. More on this in the corresponding section (Filter data).

You may add further data to an adjacent empty cell - and the formatted table should include this area.
If the cell is not adjacent to the table, it will not be included.
In case of a new column, a generic name is given automatically (for example 'Column1').
The same applies to adding a row respectively.

Technically speaking: A table cannot be considered as one unless it is not formatted as such.

Keyboard shortcuts and menu paths inside this subsection:

- Formatting a table: Home > Styles > Format as table - **ALT** > **H** > **T** > [Select design]
- Open context menu inside the column of a

formatted table for quick filtering and sorting: **ALT + ARROW DOWN**

e. Delete columns and create new ones

As stated before, the imported table from DWDS is made up from the following columns: 'No.', 'Corpus', 'Date', 'Genre', 'Bibl', 'URL', 'ContextBefore', 'Hit' and 'ContextAfter'.

The columns 'No.' (A), 'Bibl' (E), 'ContextBefore' (G) and 'ContextAfter' (H) are not important for the corpus linguistics in this example, so you might as well delete them. Proceed as follows:

Option 1: Select the column with **CTRL + SPACE** and hide it with **CTRL + -**. This also applies to multiple adjacent columns, if applicable. Repeat as needed. Please note: There is no confirmation dialogue!

Option 2: Open the context menu after you have selected the column(s). Choose Delete. Repeat the procedure as needed.

As already noted, you can select columns using the name field (**ALT + F3**). Select the columns and delete them using the shortcut or the context menu.
As you could select all these partly non-adjacent columns in one go, you could not use the delete command via the context menu subsequently. Choose single or adjacent columns and repeat as needed.

As stated above, a pivot query about the period might be interesting. To determine periods, a new column is needed. You might use a blank column immediately to the right of the table and fill it down.

In case you choose to place the period just next to the date, you need a specific command. Please place the cursor inside the column right to the date column and go to Home > Cells > Insert > Insert Sheet Columns - **ALT > H > ZC > I > C**.

Annotation: It is not necessary to highlight a whole column prior to inserting another one.

Inserting and deleting columns are just an example of editing a table. Of course, you can insert or delete rows, sheets and individual cells respectively. Explore the Cells group in the menu for further details.

A hands-on example for a new column: It might be helpful to determine if a hit comes with an online source or not.

You might check whether a cell content begins with 'http' or not.
Move to the next empty column and enter:
=IF(LEFT([@URL] ;4) = "http";TRUE;FALSE)

As the table has been formatted, the column should be calculated automatically even as you have just entered the formula into one single cell.

Move to the head cell and name the column
Is_web_source

Please read the subsection Using column names in formulas for further information about nomenclature as only some special characters are allowed while spaces are not.

As an aside: You could check whether a cell is blank or not (**ISBLANK** function). Alas, the URL column might contain protected space characters or control characters

- which would render incorrect results.

Menu paths and shortcuts inside this subsection:

- Add cells: Home > Cells > Insert > Insert Worksheet Columns - **ALT** > **H** > **ZC** > **I** > **C**
- Delete cells – **CTRL** + **-**
  (Home > Cells > Delete > Delete Columns - **ALT** > **H** > **ZC** > **D** > **C**)

f. Hiding Content

In theory, you might as well hide the columns. If you do so, keep in mind that the coordinates would not be adapted.

Hiding will not delete any content, and you can unhide the content again if necessary. To do this, select the range next to the displayed columns and use the key combination **CTRL** + **SHIFT** + **0**. If the keyboard shortcut does not work, use the context menu (Unhide).

If **CTRL** + **SHIFT** + **0** does not work, it is often Windows intercepting **CTRL** + **SHIFT** to switch input language/keyboard layout, so Excel never receives the shortcut. Disable the **CTRL** + **SHIFT** language/layout hotkey in Windows keyboard settings (set to 'Not assigned')

Please keep in mind: **Hidden ranges keep their coordinates and still can be used in formulas and functions. They have therefore not completely disappeared.**

Keyboard shortcuts and menu paths inside this subsection:

- Hide columns: **CTRL + 0** or context menu
- Unhide columns: **CTRL + SHIFT + 0** or context menu

g. Cell formatting

Having deleted (or hidden) some of the data, you can now continue with the task of the corpus linguistics. Remember: How did the contemporary use of the words meeting, deadline, timing and workload change during the last 30 years?

Depending on the context, you should format the columns appropriately, whether they contain text, numbers or something else. There is a General format, whereby the program determines the format after the input. However, this cannot always be relied upon. If possible, assign a unique format initially for all columns and do not use General at all.
As you are dealing with a corpus, the format for most columns is obvious: Text.

You could format all cells individually, in theory.
In practice, you will rarely format individual cells, but instead you will format entire columns or, in some cases, rows. Select a column with **CTRL + SPACE**.

Now go to Home > Number > Number format - alternatively, use the context menu (Format Cells > Number) or the shortcut **ALT** > **H** > **N**. Choose from numerous formats here, for example:

- General
- Number
- Currency

- Accounting
- Short Date
- Long Date
- Time
- Percentage
- Scientific
- Text
- More Number formats – You can create your own custom formats as well here. Select Custom as category.

Before you fill an entirely empty sheet or continue working with any imported data, you should define the format for each column.

If the content is text, you should select Text.

Remember: A sequence of numbers can also be a text. This is the case if you cannot calculate with a sequence of numbers. Common examples are postcodes, area codes and other unique identification numbers, such IDs or ISBNs.

Another list with even more options to select from is available under Special format.

The Format cells window comes with six tabs:

- Numbers: This tab contains the above-mentioned options for number formats (text, number, currency, percentage and so on). Selecting a format, further options become available for most formats. For number formats, you might specify

the number of decimal places and select the corresponding currency symbol for currency specifications.

- Alignment: Adjust the text alignment in the cells, i.e. horizontal, vertical and indentation. Under Text control, select among Text wrap, Fit to cell size or Join cells. Finally, you can set the text direction.
- Font: You probably already know from other applications that it is possible to add effects to fonts. Unfortunately, the feature is not accessible either.
- Frame: All the options shown relate to the frames or individual lines of tables. For example, you can select the lines to display and whether certain lines within the table should be dashed, double or thicker than others.
- Fill: You might select the background colour of columns or individual cells here. No colour should be selected as the background colour to meet accessibility standards.
- Protection: Specify whether the cells will be hidden or locked against changes. This protection only comes into effect when the worksheet is protected as well: Review > Protect > Protect sheet –**ALT** > **R**. Select Protect Sheet (**PS**) or Protect Workbook (**PW**). You can choose among numerous options inside the upcoming window.

For formatting functionalities (size, visibility, cell format and more), go to Home > Cells > Format –

ALT > H > O > ...

As mentioned above (section Delete versus clearing content): To delete content, use Home > Editing > Clear or via the shortcut **ALT > H > E > ...**. Choose from a list whether you only want to delete specific content, the format of the selected cell/column or also content, formats and comments.

To get practical, please format the remaining columns as follows:

- 'No.': Number, no decimals
- 'Corpus': Text
- 'Date': Date (set English locale and a format where months are written in words to overwrite automatically the yet German months in the filter options)
- 'Genre': Text
- 'Bibl': Text
- 'URL': Text
- 'Hit': Text

Keyboard shortcuts and menu paths inside this subsection:

- Select entire columns: **CTRL + SPACEBAR**
- Selection of a number format for entire columns or single cells: Home > Number > Number format (**ALT > H > N**)
- Open Format cells window:**ALT > H > O**

- Delete: Home > Edit > Delete (**ALT** > **H** > **D**)

h. Lookahead: Using the XLOOKUP function

The column genre is still in German. There are six different genres. To relabel the names, you could either

1. search and replace the names one by one (highlighting the column, **CTRL** + **H**) – the most obvious option, but rather quick & dirty
2. use the **SWITCH** function – basically a nested if function
3. or use the **XLOOKUP** function (probably wider used than SWITCH). The former is the option we present here.

Please copy the following table:

Table 2: Mapping table for the genre values

German	English
Wissenschaft	Science
internetbasiert	Web-based
Zeitung	News
gesprochen	Spoken
Gebrauchsliteratur	Functional writing
Belletristik	Fictional books

Paste it into a new sheet and format it (Home > Styles > Format as Table.

Move inside the table and the tab Table Design will appear. Inside this tab, you can rename the table: Table Design > Properties > Table Name –

JT > A.
Let us assume that you have renamed it as 'Mapping'.
As an aside: Renaming the sheet and renaming the table are **not** the same aspect.

Move back to the original data.

Next to the Column 'Genre', create a new one.

Move into a data cell and paste the following code:
=XLOOKUP([@Genre] ,Mapping [German] ,Mapping [Englis

This will work as follows: Take the corresponding Genre entry inside this table (**@Genre**), go to the table 'Mapping' and look up the corresponding Englisch value.

The whole new column will be filled down.

Now, two Genre-related columns exist. But please **do not** delete the original column yet! As it is still essential for the **XLOOKUP** function, deleting it would cause an error inside the new column.

You might just hide the original column.

Background: A pivot analysis can be done on columns with formulas as well but might take longer.

In case you want to keep just one column: Please copy the data cells of the new column (go to the second line and press **CTRL + SHIFT + DOWN ARROW**.
Via the context menu, select Values (**V**) as paste option.

The calculations do not exist anymore, and you may know delete the old Genre column without triggering errors and rename the new column.

Now the table is ready for the pivot analysis.

This section was a lookahead for formulas and functions. It was necessary to prepare the table for the pivot analysis while avoiding a quick & dirty approach.

In case you would like to know more about formulas and functions right away and skip the pivot analysis for now, read the chapter of the same title (Formulas and functions).

In case you do not want to distinguish between singular and plural during the pivot analysis and treat them alike, you could use the **XLOOKUP** function once more to normalize the hit values to the singular form.

Inside the raw data, move to the header of the Genre column and open the specific context menu with **ALT + ARROW DOWN**.

Here you can see the possible values of the column:

- •Meeting
- Meeting
- Meetings
- Deadline
- Deadlines
- …

Create another table for the normalization to tread every hit as if it was in singular form. Include the singular form to avoid N/A-errors and name the table 'Normalization'.

Table 3: Normalization

Original	**Normalized**

Meeting	Meeting
•Meeting	Meeting
Meetings	Meeting
Deadlines	Deadline
Timing	Timing
Timings	Timing
Workload	Workload

Insert a new column for the normalization and use the following code:

=XLOOKUP([@Hit] ,Normalization [Original] ,Normalizatio

Finally, rename the new column (i.e. 'Hits_normalized').

Again, you may copy the new column and re-paste its values to the same place to keep the table lean.

2. Pivot table for a concise data analysis

We recall the question posed in the corpus linguistics: How did the contemporary use of the words meeting, deadline, timing and workload change during the last 30 years? In the upcoming chapters, you will begin evaluating the data.

a. Analysing the data: Pivot tables and their purpose

If you have followed all the steps above, the table should now have an extra column named Is Web Source. In the next step, the data is analysed using a PivotTable.

Tables with raw data can become very extensive. For training purposes, a few hundred lines of data will suffice.

The raw data should always be retained and not changed. After all, it is part of the work and makes the process more transparent. And the raw data is often the starting point for further analysations.

What is more, large tables are not suitable for drawing quick conclusions as they are confusing - especially for blind and visually impaired people.

PivotTables summarise data, making it easier to spot trends and patterns.

The word pivot (French/English) means 'centre of rotation'.

It obviously alludes to the fact that PivotTables are very flexible and can also be changed.
Even if the original sheet is extended, you do not have to set up the PivotTable again but simply update it.

With this feature, you might reduce the use of copying, linking and formulas. And the raw data can be called up quickly via the corresponding sheet.
This makes your work much more transparent - imagine a coworker trying to retrace the pace of your working by analysing nested formulas instead.

Another advantage: You do not need to have background knowledge of databases and queries (keyword SQL - structured query language) while using PivotTables.

For small tables and rather simple data analyses, however, PivotTables may be somewhat too large a tool. Sometimes a filter or a simple formula might be sufficient for data analyses.

In the following subsection, you will create our own PivotTable based on the raw data downloaded (extended by the extra columns).

b. Create a PivotTable

In general: Before starting with the PivotTable, make sure that the table with the raw data does not contain any empty rows or columns, as this could distort the result. You should pay attention to this anyway, as the screen reader could interpret an empty cell as the end of a table.

To create a PivotTable, got the Insert tab (in the Tables group) further to PivotTable > from table/

range or use the key combination **ALT > N > V > T**. A box will pop up with two options: First, you need to choose the range or table for the data analysis. In this case, the whole table should be recognized. You do not need to enter this information manually. You can choose the PivotTable to be placed inside the current sheet or inside a new one. Please select New worksheet here, as each table should always be used as a separate sheet. This should option be selected in advance inside the dialog box. Confirm the selection and a new sheet will appear.

Even as you have chosen the PivotTable to be placed inside a new sheet, the original table does not disappear at all, and you can navigate between the sheets. With **F6**, move to the tabs below the sheet, navigate there with the **ARROW KEYS** and finally select another one with **ENTER**.

A new task pane called PivotTable fields appears inside the new worksheet. You can also navigate to this using **F6**:

At the top of the pane, you will see a selection area. Here, you can use **UP/DOWN ARROW** to choose the column **Hit** from the original table.

By default, the columns you select are sorted into fields further down. Fields are columns in this context.

- Non-numeric fields by Rows,
- Dates by columns,
- numeric fields by values.

The assignment applies to the specific example. Non-

numeric fields are not necessarily linked to rows and numeric fields are not necessarily linked to values.

There is also the Filter area.

However, the automatic sorting by rows, columns and values can also be changed or adjusted later. You may also assign a field to several areas at the same time. This will also necessary during the corpus analysis.

You can move through the fields inside the pane using **TAB**, open the context menus of the columns and rearrange them to other fields.

Alternatively, you may open a context menu when selecting the fields from the list on top of the pane and assigning the field accordingly. This may be the easier way.

No matter what you decide: Please distribute the fields as follows:

- Hit (or 'Hit_normalized'): Add to row labels and Add to values alike (for this double assignment, you must navigate via the selection list on top)
- Genre: Add to column labels

In case you have chosen the column 'Hit_normalized', the table might look as follows:

Table 4: Normalized hits by genre

[illegible]						
Deadline	41	60	397	42	134	674
Meeting	281	740	1360	404	267	3055
Timing	74	325	475	255	104	1233
Workload	3		18		17	38

Grand Total	**3**	**399**	**1125**	**2250**	**701**	**522**	**5000**

Instead of the genre, you might be interested in the hits by period.

Please go back to the original sheet and add a new column for the period:

=IF(YEAR([@Date])<=2005,"~2000",IF(YEAR([@Date])<=2015,

to group the years from 1996 to 2005 etc.

so please uncheck Hit_normaliziled and choose period instead as column label.

So, just by unchecking a single checkbox and selecting another, you get an entirely different table presented.

Table 5: Normalized hits by period

Row Labels	**~2000**	**~2010**	**~2020**	**Grand Total**
Deadline	63	188	423	674
Meeting	806	707	1542	3055
Timing	386	335	512	1233
Workload		19	19	38
Grand Total	**1255**	**1249**	**2496**	**5000**

The PivotTable been inserted is already formatted and equipped with a so-called data section so that you can filter and sort directly in it. More on this in the sections Filter data and Sort data.

You can insert a chart in addition to the PivotTable. To do this, first select all the cells in the PivotTable (**CTRL**

+ **A**) and then go to
Insert > Charts > Recommended charts -
ALT > **N** > **R**.

You can choose between different shapes, such as bar charts, column charts or line charts. Select one and confirm with **OK**.

The diagram appears in the centre of the sheet as selected and is already focussed. You can select Move diagram via the context menu and select the New worksheet radio button inside the opening dialogue window.
This separates the data into the table and diagram and prevents them from overlapping. After closing the window by confirming with **OK**, the diagram is moved, and you are in the newly created sheet.

The voice output will provide you with some information. You can customise the diagram subsequently via the context menu.
As the accessibility of diagrams is not guaranteed, we will not go into further detail here. While inserting should be accessible, subsequent editing is not.

Keyboard shortcuts and menu paths inside this subsection:

- Create PivotTable: Insert > PivotTable > from table/range -**ALT** > **N** > **V** > **T**
- Insert diagram:
  Insert > Diagrams > Recommended diagrams - **ALT** > **N** > **R**

c. Example for grouping: Group

non-normalized values

Let us assume that you have not normalized the hit values, i.e. 'Meeting' is different from 'Meetings'. Running a pivot analysis, you will get more rows (or columns) in consequence. This might be intentional - or it might not be.

You still can group the cells afterwards.

1. Move to the corresponding cells you want to group and remember their coordinates.
2. Jump to the name field (**ALT + F3**) and enter them, for example
   A5, A8, A9
   Please keep in mind whether your system uses commas or semicolons as delimiter.
3. Open the context menu and chose Group.
4. The group will have a generic name. Simply move to the cell to rename it.
5. Repeat the process for further cells.
6. Optional: Highlight the cells and choose Expand/Collapse > Collapse from the context menu as the cells are expanded by default.

Please keep in mind: The program will add a new field as you group values. In this case, 'Hit2' will represent the grouped 'Hit' values. Ungrouping (via the context menu as well as grouping) will make it disappear again.

d. Update or delete PivotTable

For updating, move the cursor into a cell in the PivotTable, open the context menu and select Refresh.

To delete the PivotTable, also move the cursor to a cell in the PivotTable. This opens the temporary tabs Pivot table analysis and Design. To delete the PivotTable, delete the entire worksheet (navigate to the sheet tabs with **F6** and delete via the context menu)

The Pivot table analysis and Design tabs are only visible when the cursor is inside a PivotTable. The same applies to the task pane PivotTable Fields

e. Conclusion of the case study: interpretation of the results

Remember the question from the beginning: How did the use of some loanwords change over time?

Three of four loanwords became more spread as the usage of the fourth one remained static.

Depending on the corpus you have used and how often the loanwords occur, you may have different values. Ultimately, this is only a matter of exemplary figures to introduce you to the program.

Corpus linguistics is a great example: MS Excel is a useful tool for evaluating and analysing large amounts of data quickly and easily.

In this corpus linguistics, you have only concentrated on a single question; analyses in practice can of course be even more complicated and comprehensive.

Using the example of the corpus linguistics, you have so far familiarised yourself with part of the navigation, imported data, formatted and expanded a table and created a PivotTable.

The case has come to an end now. In the rest of the guide, you will become familiar with further functions

of the program without the need for a specific case study.

In the following chapters, we will look at the following points in more detail:

- Filtering and sorting data
- Formulas and functions
- Define names with ranges
- Array Formulas
- Error handling

E. Filtering and sorting data

Data can be easily filtered and sorted.

To do so, tables can be extended with accessible drop-down menus.

We have already explained how to format the table as such in the practical example in the subsection Format cells as a table (Home > Styles > Format as table or **ALT** > **H** > **T**, then select a design from the drop-down menu).

If the table is formatted as described, i.e. a format template is assigned to it, a small arrow appears in the header of each column - the so-called data section. The data section can now be used to filter and/or sort the values within a column without barriers. Filtering and sorting data using the slicer will be the issue in the next two chapters.

Unfortunately, the voice output does not indicate explicitly whether there is a data section in the header row of the table. There is a workaround though: If you cannot open the context menu there, it is missing yet.

Please note: The context menus only allow you to perform a simple sort. If you want to sort by multiple levels (e.g., in the first level by year, in the second by turnover per salesperson), you must use the menu.

More on this in the corresponding section (Sort data).

1. Filter data

If the table is formatted as such and the data section has been set in the header row, a separate context menu is available in each column, to be opened with **ALT + DOWN ARROW**. In the context menu that opens (this may be read out as unknown by the voice output, but still is accessible), in addition to the option of sorting the data alphabetically in ascending or descending order, there are also text, date or number filters, depending on the content of the column. Select a text column, maximise the text filter accordingly in the header's own context menu (**ALT + DOWN ARROW**) and find the following selection options for text filters in the second level:

- equals
- Does not equal
- Begins with
- Ends with
- Contains
- Does not contain
- Custom filter

The selection options may vary depending on whether the contents of the column in question are text, numerical values or dates. The above options only apply to text filters.
Find out for yourself and try around with numerical

and date filters.

If you now select one of these options, a new Custom filter dialogue box will open. Such a filter might be interesting, for example, if you are looking for approximate values and want to combine with and/or. You can use placeholders - a question mark stands for a single character, the star symbol (*) stands for any character string.
You can specify further parameters using the two drop-down menus.

Back to the menu: Directly below the text or number filters inside the expanded context menu there is a search bar, and directly below of that a list of all content contained inside the rows of the column (without duplicates). By default, all content listed there is ticked.
You can check or uncheck the boxes next to each item. Confirm with **OK** after making any changes.

You should pay attention to the voice output: Unfortunately, it does not tell you whether all data is displayed inside a formatted table or whether it is filtered, i.e., whether some content in the context menu is unchecked. To investigate, you have to move to the checkboxes individually and check their status.

As mentioned above, you can sort data (for example alphabetically) via this context menu, but only in relation to the current column. If you want to sort by multiple levels, another method is required. This is the subject of the following section (Sort data).

As usual, the common context menu is still available, by using the corresponding key on the keyboard.

Keyboard shortcut inside this section: Open context menu for filtering/sorting – **ALT + DOWN ARROW**

2. Sort data

In addition to filtering data, it is possible to sort a table.

The menu bar should be used to sort data or tables as it offers even more options than the context menu, which was topic in the previous section.

To sort the table, you can select the entire table or a single cell. Unlike when filtering data, this does not have to be a cell inside the header row. Use either the command Home > Editing > Sort and filter (**ALT** > **H** >**S**) or Data > Sort & Filter > Sort (**ALT** > **A** > **SS**).

If you have selected the path via the Home tab, the following options are now available:

- Sort from A to Z: **S**
- Sort from Z to A: **O**
- Custom Sort: **U**
- Filter: **F**
- Delete: **C**
- Reapply: **Y**

As the options mentioned above should be self-explanatory, we will only go into user-defined sorting in detail below. After selecting Custom sort, the Sort window opens, providing multiple buttons:

- Add level
- Delete level

- Copy level
- Move Up
- Move Down
- Options

Please check the corresponding box if the data has headers (which it should have).

A tabular area appears below the buttons, containing the categories Column, Sort On and Order. You can already define the first level of sorting.

1. Select Add level. This causes another level of input fields (Column, Sort by and Order) to appear in the tabular area under.
2. Inside the rows, first select the column to be sorted. Then select the sort order (only the cell value can be selected here) and finally select the sort order (From A to Z, Z to A or User-defined).
3. If you would like to sort multiple columns, i.e., the sorting should take place over multiple steps, you simply have to go through the above steps again. To do this, click on Add layer at the top of the dialogue window again and, if necessary, move the order of the inserted layers using the two arrow buttons (up/down).

Using this procedure, you can, for example, sort on the first level by 'Hit' (the search word), on the second level by 'Period' and on the third level by 'Genre'.

Keyboard shortcuts and menu paths inside this section: Sort table – Home > Editing > Sort and filter (**ALT**

> **H** >**S**) or Data > Sort (**ALT** > **A** > **SS**)

F. Formulas and functions

You are probably familiar with the term *formula* from other contexts, but what is a formula in MS Excel? A formula in MS Excel is generally used to calculate individual values. Formulas in MS Excel always start with an equal sign, for example
=A2+A3+A4.
In MS Excel, a function acts as a prefabricated building block that can be used in formulas but does not have to be. Example: Instead of calculating the sum of cells A2 to A4 individually as in the formula above, the sum function can be used:
=SUM(A2:A4).

Formulas and functions always begin with an equal sign.

While a formula is a separate calculation in which all cells or values are specified individually, a function is a prefabricated algorithm, i.e. a specific instruction with a specific name.
This means that functions are composed of certain parameters (input values). As you can see from the example above, the program requires the cells (parameters) that are to be totalled for the sum function.

Some functions have multiple parameters, which are separated from each other by commas, or depending on the localization of your computer, by semicolons. As for the **SUM** function, you could provide multiple cells as parameters, for example:

=SUM(A10,B10,D10)
or
=SUM(A10;B10;D10)

As an aside: In anglophone countries, the comma is being used, in Central or Eastern Europe, the semicolon.
Please check which variant works for you. Whichever variant you choose, they are not to be mixed up. Either a comma is the separator, **or** a semicolon. Once you have found out the working option for you, you do not have to ask this question for you again. Throughout the tutorial, as English is the language of data processing, we will stick to the comma as the separator.

Functions can facilitate calculations and thus make formulas more concise. However, they are not exclusively limited to be used inside calculations. They can be used in conjunction with text content, as well.

Using functions, no distinction is made between upper and lower case for function names and columns. After having press **ENTER**, the input is being converted to upper case.

For further options on specific navigation handling with options, go to the subsection Inserting a function.

Please keep in mind: **A formula may refer to different

tables.** Therefore, as already mentioned, a separate worksheet should be used for each table, and the table names should be as concise and meaningful as possible.

To refer to cells inside a table on another worksheet, the name of the relevant worksheet must always be preceded by an exclamation mark. Assume that there is a table with the name 'Normalization' with values, but you are in another worksheet and want to count the number of rows of the column 'Original'. In this case, the formula is

=ROWS(Normalization [Original])

As the table is formatted as such, you can address the column that you want to total directly by placing the column name in square brackets after the name of the worksheet in the function, as it happened right above.

The function is easier to be read, and lines will not be omitted accidentally.

Use a new sheet or take at least one empty between the cell to avoid the program filling down the entire column with the same value.

MS Excel provides multiple functions, so you might not have the full syntax at hand. There are two ways in which you can select and use the correct function. Firstly, there is the AutoComplete function: If you are inside a cell and enter an equal sign and the first letters of the function you want to use, a drop-down menu opens where you have suggestions to choose from starting with the same letters. You can use the **arrow keys** and **TAB** to select and confirm the desired function from the list. The function and an open bracket then appear in the input field and the cell. For

the **COUNT** function, the following appears

=COUNT(

and the program expects the parameter(s). Typing in 'Normalization', you can use auto completion as well as with the function names. Type in completely or choose 'Normalization', and add a left square bracket.

=ROWS(Normalization [

Once again, you can use autocompletion, if you wish, to specify the Column 'Original'. Add a closing square bracket and a closing round bracket and confirm.

After confirming, the focus returns to the table, depending on the setting in the cell to the right or below the cell in which the function was entered.

The second choice to search for a function, or simply to get an overview, is via the path Formulas > Function library > Insert function - **ALT** > **M** > **F**. *A* drop-down menu opens inside the dialogue box Insert Function and a list for further selection below it. The dropdown reflects the category of the functions (for example All, Recently used, Text, Logic, Statistics, Maths & trigonometry and so on). Please select one. The list below then contains all formulas of the selected category. Select the function (e.g. **COUNT**) and confirm.

Another Function Arguments window opens, for the function parameters to be entered. In the case of the **COUNT** function, this is quite simple as there is only one parameter:

Normalization [Original]

Enter this parameter into the first field Value1. Further fields (i.e., parameters Value2, Value3 and so on) are only necessary if you wish to get a sum of multiple ranges or single, isolated cells.
The fields are dependent from the function you have chosen.
The number of input fields for parameters in the *Function arguments* window always depends on the function. If, unlike with the **COUNT** function, you would use a function with multiple mandatory parameters (for example **XLOOKUP**), multiple input fields have to be filled in, i.e., one input field for each parameter.
Each input field comes with a concise note for the parameter. This may be an exemplary number or text to let you know what type of data is expected.

A formulated sentence stands below the input fields as an explanation. If you require further help, the Help on this function link is always located at the bottom of the dialog box InsertFunction. The link opens a specific Microsoft support page for inside the browser.
If you are satisfied with all parameters inside the dialogue window, you can confirm and then land to the right of or below the cell have worked on. An example of a function with several parameters is the **IF** function, with three parameters: the search text, the text to be searched for and finally the first character. Its syntax in MS Excel is as follows:
=IF(LEFT([@URL] ,4) = "http",TRUE,FALSE).
For the **FIND** function, three input fields for the three parameters would be available in the *Function*

arguments dialogue box:

- logical test: **LEFT([@URL] ,4) = "http"** – in this case, the logical test contains another function (LEFT) to determine the first four characters of the column URL.
- value if true = TRUE
- value if false = FALSE

Keyboard shortcuts and menu path inside this section: *Formulas* > *Function library* > *Insert function* - **ALT** > **M** > **F**

1. References

With references, you can dynamically address tables and do not have to uses coordinates all over. Basically, you can combine references and coordinates inside a formula.

a. Structured references

Do you can recall the lookahead on functions (Lookahead: Using the XLOOKUP function)?

There were two hands-on examples on formulas:

1. replacing the German genre labels:
   =XLOOKUP([@Genre] ,Mapping [German] ,Mapping [En
2. normalization of plural and other word forms to the basic single variant ('Meetings' equals 'Meeting', 'Deadlines' equals 'Deadline' etc.):
   =XLOOKUP([@Hit] ,Normalization [Original] , Normalization [Normalized])

Let us recall the table for normalization. It has got two columns, 'Original' and 'Normalized'. Each original entry must be mapped.

Instead of juggling with coordinates (A2 and B2, A3 and B3, …), you can address the columns directly.

In addition, you can even give optional names to ranges (Define names with ranges).

Let us analyse the formula:

1. **XLOOKUP**: Look up a value inside another table, vertically or horizontally.

2. **[@Hit]** : Choose the corresponding 'Hit' value, **explicitly inside the same row of this table(@)**
3. **Normalization [Original]** corresponds to the original value inside the table 'normalization'.
4. **Normalization [Normalized]** : Return the normalized value corresponding to the original one.

In general (inside the following list, 'Table' and 'Column' are thought to be names):

- **Table [Column]** : entire column
- **Table [@Column]** : corresponding value inside the same row

Furthermore used, but less common:

- **Table [#Data]** : entire data area
- **Table [#All]** : entire table
- **Table [#Headers]** : header of table

Hint: You might address a sheet by using a following exclamation mark, for example:
Sheet!Table [Column]
or
Sheet!A1:B8
or
Sheet!A1
but you cannot address the column right behind the sheet.
As table names are unique throughout the spreadsheet, the exclamation mark is just an option, but not essential.

b. Absolute and relative references

If you would like to use a formula more than once, you do not have to enter it again – you can copy it.
A formula is usually filled down or to the side in the table because it is required for multiple rows or columns.
To copy a formula, select the desired cell and copy the content with **CTRL + C**.

It is important to differentiate between absolute and relative cell references before copying formulas in MS Excel. Relative cell references are automatically adjusted when formulas are copied. This is different for absolute cell references, which remain unchanged when copied. For example, if the formula

=C2*D2

is in a specific cell and you copy it to the next cell below, the formula in the adjacent lower cell to which the formula was copied changes as follows:

=C3*D3

This scheme would be adopted accordingly in the cells below:

=C4*D4

=C5*D5

et cetera. As the cells are filled down within the same column, the cell reference always jumps one row further down: The column specification remains the same and just the row specification changes.

If a formula with relative references is copied to the side, i.e., from one column to another, the column specification of the cell references changes accordingly. **A1** thus becomes **B1**, **C1**, et cetera. The row indicator

therefore remains the same and only the column indicator varies.

Relative cell references are suitable if you want to use a term across the board and not just for one cell, i.e., if cell locations are to be adjusted when copying the formula: So, if row 2 is to become row 3, row 4 and so on, or column E is to become column F. Absolute cell references can be recognised by the dollar sign that appears either previous to the column specification, previous to the row specification, or previous to both (for example **A$1**, **$B2**, **A1**). Absolute references are used if a row, a column or a complete cell, i.e., row and column, is to be kept constant during a copying process.
The formula in this example
=C2*D2
changes as follows if absolute references are used for each indicator:
=C2*D2.

The preceding dollar sign stands for an absolute reference for the respective column and row and means that the formula does not change when copied to another row, column or cell and continues to be calculated with the exact values from cells **C2** and **D2** during multiplication, regardless of which cell the formula is copied to.

Typical examples of relative references are prices listed in columns and absolute references are tax rates (20 % or 5 % for VAT), which are sometimes listed in single cells only.
Because no matter which row: When filling down, you

always want to refer to the same cells with the tax rates.

Absolute and relative references can be combined in formulas, as you need them. When copying, but also when entering formulas, you must therefore consider for each individual column and row whether the reference must be relative or absolute one.

For a single cell, for example **C2**, four combinations are always possible due to the combination of absolute and relative references:

- **C2** (column and row with relative reference), copy down causes **C3**, **C4**, ..., copy to the right **D2**, **E2**, ...
- **$C2** (column with absolute, row with relative reference), filling down causes **C3**, **C4**, ..., copy to the right **C2**, **C2**, ...
- **C$2** (column with relative, row with absolute reference) Filling the column causes **C2**, **C2** [sic]**,** ..., copying to the right **D2**, **E2**, ...
- and **C2** (both column and row with absolute reference), where the reference **C2** does not change at all, regardless of whether you fill down or to the side.

The correct use of references is essential, as incorrect cell references can quickly lead to unintentional calculations.

Finally, it is possible to display calculations or formulas directly in the cell (without the associated results). By default, formulas are only displayed in the formula bar.

To do this, navigate as follows:
Formulas > FormulaAuditing > Show formulas (**ALT** > **M** > **H**). With *Show formulas*, the display of formulas in the cells changes and the calculations used are displayed in the cells and not (as set by default) the calculation results.
You can also deactivate the display of formulas in the same way.

Keyboard shortcut and menu path inside this section:
Switch between displaying results and formulas – Formulas > Formula Auditing > Show Formulas - **ALT** > **M** > **H**

2. Selection of important functions

This selection of functions reflects only a small part of the multitude and is by no means representative of your specific needs.

Particularly noteworthy functions include

a. IF

=IF(Condition,Then,Else)

Use the IF function to test whether a condition applies or not. In many cases, the condition is used to test whether the value in a cell corresponds to a given value or value range (for example B4 >= 10, B4 = 4, B4 < 7) or whether the value of a cell corresponds to the value of another cell (for example B4 = B7). The parameters Then and Else correspond to a true or false condition.

You have already met the IF function when it came to determine the period from the date:

=IF(YEAR([@Date])<=2005,"~2000",IF(YEAR([@Date])<=2015,

Here, **YEAR([@Date])<=2005** is the condition while **"~2000"** is the then parameter.

This is a nested function, as the **IF** function is used as the else parameter.

It is important to set **double** quotation marks for expected text output, as using single quotation marks will not work.
If you want to refer to a cell or number values as output

format, do not use double quotation marks at all.
Example: You do not want to output 'yes' as a Then value, but the content of cell B1:
=IF(B4>=10,B1,"no").
If you apply the formula to text, it must always be enclosed in double quotation marks:
=IF(B2="fiction",...). Another example: You have planned costs in column B and actual costs in column C. If the actual costs are higher, you want to have 'higher costs' reported back, otherwise OK.
The formula might look like this:
=IF(C:C>B:B,"higher costs","OK")
In this example, you have not addressed single cells, but the columns as a whole.
In both examples, pre-formulated texts were used as return values.
Think for yourself what the formula would look like if you wanted to return values from a cell instead.

As an aside: Some Functions come with an inherent IF functionality, such as: **SUM/SUMIFS**, **COUNT/ COUNTIFS**, **AVERAGEIF/AVERAGEIFS**.

b. SUM

Use SUM to get a total of number values in the selected area. The cells do not have to be adjacent to each other.

Examples:

- =SUM(A:A)
- =SUM(A2:A9)
- =SUM(A:A,B:B)
- **=SUM(Table1 [Column1])** – a very generic

example for a column.

- **=SUM([@Column1],[@Column2],[@Column3])** – another yet generic example, yet for a row.
  Do not use Table1[@], as this would cause an arrow.
  A cell may not depend on its own result. See the subsection Circular reference for background information.

c. AVERAGE, MIN, MAX, COUNT, COUNTA, COUNTIF

Provide a range of cells to get their average, minimal or maximal value, or to count them, respectively. On the lines of the SUM function, you can provide cells, ranges, names or columns. While **COUNT** is limited to numerical values, **COUNTA** will include all non-empty cells, be it numerical values or text.

You can use this **COUNTIF** to count cells in which certain condition is met.

=COUNTIF(range,search_criteria)

For example, if you want to analyse how often the word 'fiction' (criteria) occurs in a column (criteria range), the function could be as follows:
=COUNTIF(C:C,"fiction")

d. LARGE and SMALL

Use **LARGE** and **SMALL** to return the x-largest, or x-smallest value, respectively.

For example,

=LARGE(range;2)

would return the second-largest value of the range.

e. XLOOKUP

Historically, looking up was rendered by the functions **HLOOKUP** (horizontal) and **VLOOKUP** (vertical). They still work, but as you are learning the programme, it is recommended to stick to **XLOOKUP** right away. Generally, the function looks like this:

=XLOOKUP(lookup_value, lookup_array, return_array, [if_not_found], [match_mode], [search_mode])

Mandatory parameters

- lookup value: The value you are looking for
- lookup array: The column or row inside another table where you want the program to search
- return array: The corresponding column or row for the lookup

Optional parameters:

- if not found: Text returned in case nothing is found
- match mode: 0 (exact match), -1 (exact or next smaller), +1 (exact or next larger
- search mode: 1 = first-to-last (default), -1 = last-to-first (useful for “last match”), 2 = binary search (ascending, must be sorted), -2 = binary search (descending, must be sorted)

Make sure each sheet contains one table only, and each table is formatted as one and has an expressive name.

Inside the subsection Lookahead: Using the XLOOKUP function, you have already read about this function:

=XLOOKUP([@Hit] ,Normalization [Original] ,Normalizatio

In this case, just the mandatory parameters have been used.

Read the section References to address the parameters properly.

f. SUBTOTAL and AGGREGATE

=SUBTOTAL(function_number,range1 [,range2, …,range_x])

Select a function by number. Provided functions are

1. **AVERAGE**
2. **COUNT**
3. **COUNTA**
4. **MAX**
5. **MIN**
6. **PRODUCT** (a plain multiplication)
7. **STDEV.S** (standard deviation for a sample)
8. **STDEV.P** (standard deviation for a population)
9. **SUM**
10. **VAR.S** (variance based on a sample)
11. **VAR.P** (variance based on the entire population)

Use the plain number to use one of the listed functions.

Examples:

=SUBTOTAL(1,range)

will return the average of a range, while

=SUBTOTAL(7,range)

will return the standard deviation for a sample.

Using the numbers 1 to 11 will ignore the fact that cells might be hidden, i.e. the hidden values will be part of the calculation.

Using the numbers 101 to 111 will sort out hidden values from the calculation.

Example:

=SUBTOTAL(101,range)

will return the average of a range, not considering any hidden values.

AGGREGATE works similar to **SUBTOTAL** but is more powerful and gives you more options for ignoring specific values.

=AGGREGATE(function,option,range1[,range2, …,range_x])

You may choose from 19 functions

The first eleven are the same as they are with using SUBTOTAL. Further functions are:

1. **MEDIAN**
2. **MODE.SNGL** (most frequently occurring number)
3. **LARGE**
4. **SMALL**
5. **PERCENTILE.INC** (percentile (inclusive))
6. **QUARTILE.INC** (quartile (inclusive))
7. **PERCENTILE.EXC** (percentile (exclusive))
8. **QUARTILE.EXC** (quartile (exclusive))

We will not cover these functions in detail.

Furthermore, you can select how to handle hidden values or errors

1. ignore nothing (as errors are ignored, the calculation might crash – this is the default mode in MS Excel. You can leave out the 0 here)
2. ignore hidden values (as errors are ignored, the calculation might still crash)
3. ignore errors (but consider values even in case they are hidden)
4. ignore errors and hidden values
5. ignore nested **SUBTOTAL** and **AGGREGATE** values, thus ignoring duplications
6. ignore hidden values, nested values
7. ignore errors and nested values
8. ignore errors, nested values and errors

As there are advanced options for ignoring unrequested values, the function range is limited from 1 to 19.

3. Concluding remarks on functions

We hope these examples will help you to understand functions in MS Excel. To get an overview of other functions in, we refer to the alphabetical list of MS Excel functions [Microsoft Support. (n.d.). Excel functions (alphabetical). Retrieved from Microsoft Support: **https://support.microsoft.com/en-us/office/excel-functions-alphabetical-b3944572-255d-4efb-bb96-c6d90033e188**]. There you will also find a list by **category** [(Microsoft Support, n.d.)]. Alternatively, help is available inside the *Insert function* dialogue box while you insert a function via the menu (**ALT** > **M** > **F**) and search for a function there.

Searching on the Internet can also be very helpful, but accessibility may be limited if illustrative tables are stored as images, for example.

Keyboard shortcuts inside this section: Open context menu to error a cell after entering a function - **ALT** + **SHIFT** + **F10**

4. Nesting and combining functions with formulas

Functions can be nested and combined. This means that another function is used in place of a parameter inside another function. It is important that the return value of the nested function corresponds to the value that can normally be entered as a parameter in the higher-level function. Let us take a look at an example of a nested **IF** function: The alternative (else value) is not a fixed value, but a second condition is to be checked at this point, which is again the result of an IF*function*. The generic syntax is:

=IF(Condition,Then,IF(Condition,Then,Else))

In concrete terms, you have already met an example:

=IF(YEAR([@Date])<=2005;"~2000";IF(YEAR([@Date])

If the year is less than or equal to 2005, the value "~2000" is returned. Else: If it is less than or equal to 2015, "~2010" will be the value, otherwise "~2020".

When combining and nesting functions, you are not limited to combining identical functions. For example, you can also combine the **IF** and **AND** functions with each other. This is useful if you want to specify two conditions for an IF function:

=IF(AND(condition1,condition2),Then,Else)

Another, more theoretical, example of nested functions is the combination of the SUM and IF functions, which is useful if you want to calculate a sum under a certain condition. However, you can also use the SUMIF

function directly for this specific case, which is specifically used to calculate the sum under a certain condition.

Nesting in this case is just an example for another approach.

A typical example of **SUMIF** is the calculation of sales revenue per salesperson.

You have a table 'Sales' with columns A and B for names and individual sales.
In another worksheet, column A contains the names without duplicates and in column B the **SUMIF** function is to be used:
=SUMIF(Sales!A:A,A:A,B:B)
Columns A and B, which are not labelled further, are in the new worksheet.
In general form, the function looks like this:
=SUMIF(Range,Search_Criterion,Sum_Range)

Feel free to append further calculations. For example, if you want to calculate twice the sum, append a multiplication after the **SUM** function:
=SUM(A1:A3)*2.

Finally, you should note when nesting and combining: The more functions and calculations are combined, the more brackets need to be set. Therefore, always make sure that you have set all brackets in the formula correctly after input. Otherwise, you will receive an error message, more on this in the chapter Error handling.

G. Define names with ranges

Use ranges to assign a name to a cell or an entire cell range to make it easier to find your way around and improve readability.
Names are used to replace cell coordinates.
If you have formatted a table as such, you can already work with the column and row headings.
This may be enough for you.
But perhaps you would like to name your own ranges.

Using the corpus linguistics as an example, you can define a name as follows: The table imported from DWDS may extend from **A1** to **G301**. Using Ranges, the table can be labelled with a name instead of its coordinates - for example 'Text_analysis' instead of **A1:G301**.

To create a range, please select the table and choose Formulas > Defined names > Define names > Define names - **ALT** > **M** > **M** > **D**. A dialogue window opens to enter a name, define the range (entire worksheet or individual table) and add comments.

If you want the range to be available in the entire workbook and not just in a specific sheet, leave the default option Workbook.

Make sure you use a meaningful name so that names can be clearly assigned again later.
Finally, the coordinates must be correct. If there is only one table in the worksheet - as there should be - the coordinates are already in the correct form in the input field. Confirm with **OK** to close the dialogue window.

The so-called name manager is also available. All defined names are available here.
Ranges formulas can be used to make parts of tables more readable.

Let's assume you want to label the columns 'Genre', 'Bibl' and 'URL' with the name 'bibliographic'.

Move to the header cell 'Genre', and use **SHIFT** and **arrow left** to highlight the headers 'Bibl' and 'URL' as well. With **SHIFT** + **CTRL** + **Arrowdown** you highlight the columns in their whole.

With the desired range being selected, go to Formulas > Defined Names > Define Name > Define Name – **ALT** > **M** > **M** > **D**.

Inside the upcoming window, choose 'bibliographic' as name, select 'Workbook' as scope for using it everywhere inside the file. The range technically spoken extends as follows (as presented inside the last field):

=raw_data[[#All];[Date]:[URL]]

where 'raw_data' is the name of the table (given the assumption, you have named it that way), [#All] refers to the columns including their headers, and [Date]:[URL] specifies the column range. Confirm and the name is ready to be used.

Instead of highlighting the range, you can open the dialog window initially and define the range inside the last field (=raw_data...).

To use a inside a formula, please begin with the formula and then use Formulas > Defined names > Use in formula - **ALT** > **M** > **A**. A drop-down menu with defined names becomes available, where all previously assigned names are listed.

Typing a formula, you might write the name directly into the formula bar, without double quotation marks. Or select the name from the menu via Use in formula, alternatively. Following the selection, the name is inserted, and the cursor is positioned right behind the name.

Another feature: If you enter a name into the name field, the corresponding range in the sheet is highlighted directly.

Using expressive names for sheets, tables and columns, you might not need extra defined names, though.

Keyboard shortcuts and menu paths inside this section:

- Define names: Formulas > Defined names > Define names > Define names - **ALT** > **M** > **M** > **D**
- Use names inside a formula: Formulas > Defined names > Use in formula - **ALT** > **M** > **S**

H. Array formulas

Array formulas, also seldomly known as matrix formulas, are advantageous to avoid ranges or columns and rows for intermediate calculations.

Example: There are numerical values in the range from A1 to E2. The numbers are to be multiplied line by line and the results of the multiplications added together to form the sum of the multiplications, i.e.
=A1*B1+A2*B2+A3*B3+A4*B4+...

Instead of entering a long formula containing all the individual calculation steps or creating a new column (**C**) for the multiplication results and having to add them up, you might use an array formula.

In this example, column A represents quantities, B the unit prices and the fictitious column C for the total prices (which are totalled again).
With array formulas, multiple calculations are possible at the same time and multiple areas in the table can be combined with a single formula.
The following example illustrates the procedure for using an array formula:

1. Go to the cell in which you want to enter the array formula.
2. Enter the formula. As usual, it begins with an equal

sign (=).

3. You can use the **SUM** formula as an example: **=SUM(A:A*B:B)**.
4. Unlike when entering normal formulas, you conclude the input for array formulas with **CTRL + SHIFT + ENTER**.
   The formula is now automatically enclosed in curly brackets. With new program versions, this key combination is no longer necessary and normal input with **ENTER** is sufficient to complete the curly brackets.

I. Error handling

Sometimes an input cannot be processed, and an error occurs after pressing **ENTER**.

Errors appear in the input cell as an error code consisting of a hash, followed by a text abbreviation and a final exclamation mark. Common error codes are, for example, #DIV/0! for a division by zero, #NUMBER! for numerical errors, or #NAME for an incorrect or unintended name.

Depending on the voice output and its settings, it may also be explicitly mentioned that an error exists or has occurred in the cell. The error code, on the other hand, is always announced as the cell content.

To assure that no error has occurred, it is best to return directly to the cell after having entered a formula and check the output. If you have activated acoustic feedback, you will hear a sound (*MS Excel options > Accessibility*).

In the following, we will present the most common types of errors and explain how to display the errors, as the normal search (**CTRL + F**) unfortunately ignores error messages. Thus, for example entering #N/A into the search window **does not display** errors concerning non-availability.
Instead, MS Excel has an error checking functionality to look for specific errors, which we will describe inside

the section Error checking.

1. Error messages

Errors are categorised and are identified by abbreviations, the so-called error codes. An error code provides an initial indication of what may have gone wrong during input. Below you will find a list of the most common error codes:

- *#DIV/0!* - Division by zero. As much as division by zero fascinates the world of mathematicians to this day, it is not permitted in the application and is therefore displayed as an error.
- #INV! – The value of the cell is invalid. This error occurs very frequently, for example, when text is placed where numbers should be due to the formatting.
  If numbers and text are used together in a cell ('20 % VAT'), it is text. You cannot calculate with text.
- #NUM! – An unauthorised calculation might trigger this error, for example taking the negative square root.
  The number can theoretically be too large or too small (this should be extremely rare in practice - numbers with just over 300 digits are still possible).
- *#NULL!* - There is a space inside the formula. Either instead of a separator (be it a comma or semicolon), or instead of a calculation operator. Examples:
  =MAX(C1 C2 C3 C4) instead of

$=$**MAX(C1,C2,C3,C4)** or
$=$**A1 A2** instead of
$=$**A1** $+$ **A2**.
Note: In the first example, the maximum of different values is searched for.

- #REF – ranges or lines that are listed in the formula no longer exist. Renaming should not trigger this error as the references inside the formulas should be updated.

- *#NAME?* - There are multiple causes for this error code to occur. On the one hand, misspelling might be the cause.
  Sometimes this error is triggered by text inside a formula while this text is not enclosed inside double quotation marks. As you can name cells or ranges and use these names in formulas (ranges), the program assumes that the text is a defined name if there are no double quotation marks – which is not the case here.
  Finally, the error can also occur if a defined name is misspelled.

- *#N/A* - The value does not exist. This may be the case if an empty cell has been referenced or a value you want to look up does not exist.
  This error might occur especially using the function **XLOOKUP**. Example: You use a reference function and enter the name 'Miller' there, but it does not exist inside the row data.

- #Spill: In some cases, multiple cells are required for an output. This is the case, for example, with the formulas **ISTEXT**, **ISNONTEXT**,**ISNUMBER**

(is text / is not text / is number) if these are applied to a range. An output is to be expected for each individual cell. Accordingly, there must be enough space at the location where the results are to be presented. If there is enough space, MS Excel fills the empty cells (called overflow).
If there is not sufficient space because filled cells are adjacent, the corresponding error will appear.
Palpable example: You want to check whether cells A1 to A4 contain text and enter the formula
=ISTEXT(A1:A4)
into C1.
Four cells (C1 to C4) are required for the output. If there is not enough space because one of the cells following C1 (C2 to C4) is already occupied, an overflow occurs.
Make sure there is enough space to avoid this error. In other words, keep the cells C1 to C4 clear.

2. Errors without error codes

a. Circular reference

You should bear in mind that there is not always an error code appearing after input: A so-called *circular reference* is not announced inside the cell, but inside a separate dialogue window. This happens if the result cell is part of the function. So, if the sum of cells A1 to A7 is to be calculated inside cell A7, this is precisely the error.
Indirect circular references are also possible: A first formula (example: cell B1) refers to a second (C1), and this refers to the first again (B1).

As mentioned, a dialogue box appears for a circular reference ("There are one or more circular references where a formula refers to its own cell either directly or indirectly. This might cause them to calculate incorrectly.
Try removing or changing these references, or moving the formulae to different cells."). Once you have closed the box, you should correct or at least delete the formula to prevent a false zero.

b. Empty cells

Another example with no error but the output 0, where a different value is expected: It is possible that the formula in this case refers to without exception empty cells.
Example: Cells E1 to E6 are empty and you want to

calculate the total in cell E7.

3. Error checking

An error might be overlooked so easily. However, you can also search for errors afterwards via Formulas > Formula Auditing > Error checking > Error checking (**ALT** > **M** > **K** > **K**).

The corresponding *error check* dialogue box opens, in which the first error appears immediately.
The cell, the formula text and the error category with explanation are listed on the left.

Use the buttons on the right to get Help on this error, Show calculation steps, ignore error or jump directly to the formula bar (Edit in formula bar). The selection options correspond to the entries in the context menu for an error in the cell.

With the Options... button, open the formula options located inside the program options.

Navigate through the errors inside the current worksheet using Previous and Next.

If an error code appears in a cell, open a separate context menu for error checking by pressing **ALT** + **SHIFT** + **F10**.
The context menu consists of the following items:

- *Error*: The category of the error is displayed first (name, value, reference, ...).
- *Help for this error*: A corresponding article opens inside a new task pane.

- *Show calculation steps*: This feature is helpful for nested formulas. Trace the calculation step by step in the *Evaluate formula* dialogue box here. A note appears if the next step will lead to an error. Evaluating a nested formula step by step [(Support, Microsoft, n.d.)]
- *Ignore error*: The error code remains inside the cell, but the error no longer appears in the error check dialogue, and **you can no longer open this context menu**.
  This selection is therefore not recommended, as an error rarely remains alone - it often leads to subsequent errors on other places.
- *Edit in the formula bar*: This moves the cursor to the end of the formula inside the formula bar. Alternatively, press **F2**.
- *Error checking options*: This opens the *Formulas* tab in the *MS Excel Options* dialogue box (Calculation options, Working with formulas, Error checking, Rules for error checking).

a. Get data type (TYPE)

As stated before, the type of content is not obvious in all cases, and you might want to check the data type explicitly.

Example A new column 'Web source?' has been created. Its content is either 'TRUE' or 'FALSE'.

Using the formula
=IF(LEFT([@URL] ;4) = "http";TRUE;FALSE)
creates Boolean output, while
=IF(LEFT([@URL] ;4) = "http";"TRUE";"FALSE")

would provide the output as text respectively. Please note the added double quotation marks.

Boolean values are a better choice as they are processed more reliable than text values.
Imagine you are working on a file which was edited with a non-English program version before and you would like to open it with English set as MS Office Language.
In case of the Boolean version of the formula, TRUE and FALSE will be rendered correctly translated regardless of the original language. On the other hand, text is static and will remain the same.

This is one example where a different data type might be a difference.

Using the formula
=TYPE([@[Is_Web_source]])
the output is rendered in numerical values:

- 1: Number
- 2: Text
- 4: Logical value (Boolean)
- 16: Error value
- 64: Array
- 128: Compound data

Thus, the first formula inside this section () would provide '4', while the second one would provide '2'.

You might use the filter functionality to check for values you would not expect.

b. Useful functions for troubleshooting

IFERROR

=IFERROR(value, value_if_error)

Use the *IF ERROR* function to output your own error text if an error occurs in a formula or after entering a formula or function. The error text output is autonomously of the type of error and is therefore not always informative. However, unlike with the program's error codes, you will be able navigate through the errors using the default search functionality (**CTRL + F**) if an error occurs.

Example:

=IFERROR(SUM(A0:A3),"Error!").

'Error!' is displayed instead of the classic error message (error code) if the formula triggers an error.

ITEXT, ISNONTEXT, ISNUMBER, ISBLANK

These formulas check whether a cell contains text, no text, a number or is empty, respectively.

The syntax is **=ISTEXT(value)**,

=ISNONTEXT(value),

=ISNUMBER(value),

=ISEMPTY(value),

respectively.

All formulas in this group have only one parameter 'value', which may be a cell or a cell range. If a cell range is specified as a parameter, the result is also returned in a range that has the same form as the range that is to be checked. The return value is TRUE if the 'value' is text/no text/a number and FALSE if this is not the case. Correspondingly for **ISBLANK**, if the cell is empty (**a space means that the cell is no longer considered as empty**).

J. Conclusion

We hope that this guide will not only serve as an orientation, but also as a practical aid if you get stuck when working with the program.

Now that you have read all the chapters of the guide, you will have learnt how to use MS Excel and at the same time become familiar with the application of the program using a practical example.

Formulas, functions, multiple sheets, pivots, error handling – and more. It certainly takes time to use the programme to its full extent and to become confident in its operation.

Before you even get started, you have to take care of importing and formatting.

And finally, you do not write down the content directly but always must keep two levels in mind: the formulas or functions and the values displayed.

Filtering and sorting are still simple functionalities.

Dealing with formulas and errors takes some practice.

The program is far from explained entirely with this guide. Pivot tables, array formulas and names are just three examples of advanced functionalities. However, this introductory work should not be too extensive. You may have noticed that we have not covered all the tabs and menu items. For example, in addition to the tools

covered in the guide, one can also create a what-if analysis or forecast sheet. As these two features are less compatible with the corpus linguistics of our practical example, we have not covered them.

We hope that this guide has given you a good introduction to MS Excel and that you are curious to find out more.

If you have any suggestions for improvement when writing your work or discovering it in the program, we would be delighted to receive feedback.

Good luck and, of course, have fun with your future work!

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Giessen, March 2026

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L. List of tables

Table 1: Sample browser export (extract)

Table 2: Mapping table for the genre values

Table 3: Normalization

Table 4: Normalized hits by genre

Table 5: Normalized hits by period